COMPLETE LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle.

2. (Previously Amended) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle; and

the system having both a heating closed-loop cycle and a cooling closed-loop cycle, the system having at least one first auxiliary refrigerant pump and at least one second auxiliary refrigerant pump, the at least one first auxiliary refrigerant pump operative to pump refrigerant fluid during the heating closed-loop cycle and the at least one second auxiliary refrigerant pump operative to pump refrigerant fluid during the cooling closed-loop cycle.

3. (Previously Amended) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle; and

wherein the auxiliary refrigerant pumps are adapted to offset system pressure differentials associated with refrigerant system head pressure and system pressure losses associated with the refrigerant line.

4. (Previously Amended) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle; and

the system having a heating closed-loop cycle and a cooling closed-loop cycle, the system further comprising expansion valves connected in the refrigerant line and wherein the at least one auxiliary refrigerant pump is operatively connected in refrigerant line between the expansion valves.

5. (Original) The system of claim 1 wherein the at least one auxiliary refrigerant pump is selected from a group comprising a centrifugal pump, a positive

displacement pump, a positive displacement pump magnetically coupled to a drive motor, a vane pump, and a side channel pump.

6. (Original) The system of claim 1 wherein the at least one auxiliary refrigerant pump comprises a scroll compressor.

7. (Original) The system of claim 1 wherein the at least one auxiliary refrigerant pump can be operated at variable speeds.

8. (Previously Amended) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle; and

wherein the at least one auxiliary refrigerant pump is reversible.

9. (Previously Amended) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle; and

wherein the at least one auxiliary refrigerant pump is self-priming.

10. (Currently Amended) The system of claim 1, ~~the compressor~~ further comprising an oil separator connected to the compressor.

11. (Previously Amended) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle;

the system having both a heating closed-loop cycle and a cooling closed-loop cycle, the system having at least one first auxiliary refrigerant pump and at least one second auxiliary refrigerant pump, the at least one first auxiliary refrigerant pump operative to pump refrigerant fluid during the heating closed-loop cycle and the at least one second auxiliary refrigerant pump operative to pump refrigerant fluid during the cooling closed-loop cycle; and

further comprising means to vary the operation of the at least one auxiliary refrigerant pump to equalize refrigerant fluid pressures on input and output sides of the compressor prior to compressor start-up.

12. (Original) In a closed loop, direct exchange heat exchange system, the system having a refrigerant transport line operatively positioned in the system after a condenser and before an expansion valve, and wherein the expansion valve is operatively positioned in the system before an evaporator, an improvement comprising an auxiliary refrigerant pump operatively connected to the refrigerant transport line.

13. (Original) A method of reducing the effects of pressure differentials and refrigerant line resistance factor losses in a closed loop, direct expansion

refrigerant heat exchange system having a refrigerant fluid transport line comprising the step of adding an auxiliary refrigerant pump to the refrigerant fluid transport line.

14. (Previously Amended) The system of claim 1 wherein the in-ground heat exchanger is positioned in a deep well.

15. (Original) The system of claim 14 wherein the deep well is a dry well.

16. (Previously Amended) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle;

wherein the in-ground heat exchanger is positioned in a situated in a deep well; and

wherein the deep well is a wet well.

17. (Original) The system of claim 14 wherein the deep well is partially dry and partially wet.

18 (Original) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-water heat exchanger, and a refrigerant line operatively connecting the compressor, the in-water heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one

auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle.

19. (Original) The system of claim 18, the system having both a heating closed-loop cycle and a cooling closed-loop cycle, the system having at least one first auxiliary refrigerant pump and at least one second auxiliary refrigerant pump, the at least one first auxiliary refrigerant pump operative to pump refrigerant fluid during the heating closed-loop cycle and the at least one second auxiliary refrigerant pump operative to pump refrigerant fluid during the cooling closed-loop cycle.

20. (Original) The system of either claim 18 or claim 19 wherein the auxiliary refrigerant pumps are adapted to offset system pressure differentials associated with refrigerant system head pressure and system pressure losses associated with the refrigerant line.

21. (Previously Added) A direct expansion, refrigerant-based, heat exchange system comprising a compressor, an interior heat exchanger, an in-ground heat exchanger, and a refrigerant line operatively connecting the compressor, the in-ground heat exchanger and the interior heat exchanger in a closed-loop configuration, and at least one auxiliary refrigerant pump operatively connected to the refrigerant line and operative to pump refrigerant fluid during a system closed-loop cycle;

the system having both a heating closed-loop cycle and a cooling closed-loop cycle, the system having at least one first auxiliary refrigerant pump and at least one second auxiliary refrigerant pump, the at least one first auxiliary refrigerant

pump operative to pump refrigerant fluid during the heating closed-loop cycle and the at least one second auxiliary refrigerant pump operative to pump refrigerant fluid during the cooling closed-loop cycle; and

wherein the auxiliary refrigerant pumps are adapted to offset system pressure differentials associated with refrigerant system head pressure and system pressure losses associated with the refrigerant line.